

## Claims

WHAT IS CLAIMED IS:

1. A computer program product encoding a computer program for executing on a computer system a computer process for optimizing indirect method invocation at a call site, the call site being associated with a receiver object, the call site further being programmed to call a target method of a plurality of possible target methods that return constant values, the target method being associated with the receiver object, the computer process comprising:

generating a return constant table having an entry associated with a constant return value of the target method of the receiver object; and

generating an optimized instruction in association with the call site to retrieve via the return constant table the constant return value associated with the target method.

2. The computer program product of claim 1 wherein the operation of generating a return constant table comprises:

inserting the constant return value associated with the target method into a dispatch table associated with the receiver object, wherein the dispatch table includes the return constant table.

3. The computer program product of claim 1 wherein the operation of generating a return constant table comprises:

inserting the constant return value associated with the target method into a return constant table, the return constant table being independent of a dispatch table associated with the receiver object.

4. The computer program product of claim 3 wherein the operation of generating a return constant table further comprises:

associating the return constant table with the receiver object.

5. The computer program product of claim 1 wherein the operation of generating a return constant table comprises:

determining that the target method is not callable from a non-transformable site; and

inserting the constant return value associated with the target method into a dispatch table

5 associated with the receiver object, wherein the dispatch table includes the return constant table.

6. The computer program product of claim 1 wherein the computer process further comprises:

evaluating the plurality of possible target methods to determine whether each possible target method is constant-returning.

7. The computer program product of claim 1 wherein the computer process further comprises:

evaluating the plurality of possible target methods to determine whether each possible target method has at least one side effect.

8. The computer program product of claim 1 wherein the operation of generating an optimized instruction comprises:

generating a fetching instruction programmed to retrieve via the return constant table the constant return value associated with the target method.

9. The computer program product of claim 1 wherein the operation of generating a return constant table comprises:

evaluating the plurality of possible target methods to identify the associated constant return values; and

5 storing the associated constant return values into the return constant table

10. The computer program product of claim 1 wherein computer process further comprises:

identifying a restricted set of one or more values of a control variable associated with a control operation;

5 identifying a restricted set of one or more types associated with the restricted set of one or more values of the control variable; and

optimizing one or more control targets associated with the control operation based on restricted set of one or more types.

11. The computer program product of claim 1 wherein computer process further comprises:

identifying a restricted set of one or more values associated with a control variable;

identifying one or more target methods providing the values associated with the restricted

5 set;

mapping between the restricted set of values of the control variable and a restricted set of types based on the one or more target methods; and

optimizing one or more control targets associated with the control statement based on the restricted set of types.

12. A method of optimizing indirect method invocation at a call site, the call site being associated with a receiver object, the call site further being programmed to call a target method of a plurality of possible target methods, the target method being associated with the receiver object, the method comprising:

5       determining that the plurality of possible target methods return constants and have no side effects;

          generating a return constant table associated with the receiver object, the return constant table having an entry associated with a constant return value of the target method of the receiver object; and

10       generating an optimized instruction in association with the call site to retrieve via the return constant table the constant return value associated with the target method.

13. The method of claim 12 wherein the operation of generating a return constant table comprises:

          inserting the constant return value associated with the target method into a dispatch table associated with the receiver object, wherein the dispatch table includes the return constant table.

14. The method of claim 12 wherein the operation of generating a return constant table comprises:

          inserting the constant return value associated with the target method into a return constant table, the return constant table being independent of a dispatch table associated with the receiver  
5   object.

15. The method of claim 14 wherein the operation of generating a return constant table further comprises:

associating the return constant table with the receiver object.

16. The method of claim 12 further comprising:

evaluating the plurality of possible target methods to determine whether each possible target method is constant-returning.

17. The method of claim 12 wherein the computer process further comprises:

evaluating the plurality of possible target methods to determine whether each possible target method has at least one side effect.

18. The method of claim 12 wherein the operation of generating an optimized instruction comprises:

generating a fetching instruction programmed to retrieve via the return constant table the constant return value associated with the target method.

19. The method of claim 12 wherein the operation of generating a return constant table comprises:

evaluating the plurality of possible target methods to identify the associated constant return values; and

storing the associated constant return values into the return constant table

20. The method of claim 12 further comprising:

identifying a restricted set of one or more values of a control variable associated with a control operation;

5 identifying a restricted set of one or more types associated with the restricted set of one or more values; and

optimizing one or more control targets associated with the control operation based on restricted set of one or more types.

21. The method of claim 12 further comprising:

identifying a restricted set of one or more values associated with a control variable;

identifying one or more target methods providing the values associated with the restricted set;

5 mapping between the restricted set of values of the control variable and a restricted set of types based on the one or more target methods; and

optimizing one or more control targets associated with the control statement based on the restricted set of types.

22. A compiler for optimizing indirect method invocation at a call site, the call site being associated with a receiver object, the call site further being programmed to call a target method of a plurality of possible target methods that return constant values, the target method being associated with the receiver object, the compiler comprising:

5 a constant return optimizer generating a return constant table associated with the receiver object and generating an optimized instruction in association with the call site to retrieve via the return constant table a constant return value associated with the target method.

23. The compiler of claim 22 further comprising:

a control operation optimizer identifying a restricted set of one or more values of a control variable associated with a control operation and identifying a restricted set of one or more types associated with the restricted set of one or more values; and

5 the control operation optimizer further optimizing one or more control targets associated with the control operation based on restricted set of one or more types.